

LOW-TEMPERATURE GROWN HIGH-QUALITY ULTRA-THIN PRASEODYMIUM GATE DIELECTRICS

ABSTRACT

A praseodymium (Pr) gate oxide and method of fabricating same that produces a high-quality and ultra-thin equivalent oxide thickness as compared to conventional SiO₂ gate oxides are provided. The Pr gate oxide is thermodynamically stable so that the oxide reacts minimally with a silicon substrate or other structures during any later high temperature processing stages. The process shown is performed at lower temperatures than the prior art, which further inhibits reactions with the silicon substrate or other structures. Using a thermal evaporation technique to deposit a Pr layer to be oxidized, the underlying substrate surface smoothness is preserved, thus providing improved and more consistent electrical properties in the resulting gate oxide.